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THE SOVIET SCHOOL OF AERODROME CONSTRUCTION

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1. Selection of Sites for Airfields

A site-selecting technique was being evolved while the problems of airfield layout were being solved (1935 - 1936). Various methods for locating airfields were worked out in detail, giving full particulars of all site-investigation work, such as topographical, hydrogeological, soil, ground, etc. This type of procedure, with its sound theoretical and practical basis, is still nonexistent abroad.

2. Airfield Layout

It should be pointed out that the principle governing the use of artificial surfaces on USSR airfields differs radically from foreign practice in this matter. For example, in the United States artificial surfaces are planned and laid as a number of narrow take-off and landing strips disposed at angles to each other. In the USSR, these strips are fewer but considerably wider. Thus, although the areas of the artificial surfaces on Soviet and American airfields are practically the same, the principle of layout is different.

As experience has shown, the Soviet principle of runway layout has enormous advantages. The crux of the matter is that in the American system the importance of a side wind is diminished, as it was, by increasing the number of runways. However, when the number of runways is large, some of them are practically never used. Moreover, the American principle of runway layout does away with the turf-surface airfield, i.e., aviation is deprived of one of the essential elements of an airport which has a number of operational advantages.

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The Soviet principle of airfield planning provides for take-off of heavy aircraft and for group take-off of light aircraft, thereby increasing the traffic capacity of the airport. The airfield with a turf surface is retained.

At the end of the 1920's and beginning of the 30's the use of circular flying fields for permanent airports was extended. These airdromes were larger and better equipped than earlier types. Also, construction began on airports with noncircular flying fields.

In 1934 Soviet specialists were well on the way to solving the following problems: (1) plan for an airport, (2) shape of flying fields, (3) utilization of natural relief, (4) flying field and runway surfaces, (5) operational rating of flying fields, (6) optimum slope of flying fields, (7) runway orientation, and (8) calculation of the dimensions of the basic elements of an airport.

Many of the above matters of principle, successfully solved in the USSR 15 years ago, have still not been solved abroad. In this connection, it is significant that at the airport-design competition held in London in 1945 the prizes were awarded to the projects in which the shape of the flying field was that arrived at by the principles and methods adopted in the USSR.

3. Airfield Construction Technique

Prior to 1928 - 1930, earthwork on flying fields formed only an insignificant part of the total work involved in building an airport. The first experiment on mechanizing laborious earthwork, using excavators and trolleys, during construction of an airport in which the depth excavated was over 2 meters, showed the necessity for special planning. A method for estimating the volume of earthwork "by isolines of working marks" was devised in 1930 - 1932 and the theoretical foundation of all present-day methods was laid.

With the industrialization of the country, road-building machines, such as scrapers, graders, rollers, etc. began to be used for airfield work.

Up to 1933 - 1934, the main airfield surface was turf. However, when the relief of large sites had to be altered, new problems, associated with the removal of the vegetation layer and the provision of sound turf covering for cuttings and embankments, arose. Numerous laboratory and field investigations created a school of Soviet airport agrotechnology. The first artificial surfaces on USSR airports were made of cement -- concrete blocks. At the same time airports were built with ground asphalt coverings as an experiment.

4. Hangars

In 1924 - 1925, Soviet designers produced a number of original projects for wood and metal hangars with a span of up to 35 meters, designed for large numbers of aircraft.

5. Gasoline Storage

With the increase in engine horsepower and the number of aircraft based at a single airdrome, gasoline-storage requirements became considerably greater. The existing methods of keeping fuel in small containers in cellars were inadequate (1924 - 1925).

Original storage systems with fire safeguards, solving the centralized aircraft fueling problems, were soon evolved.

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6. Year-Round Operation

In 1928, an airfield was equipped with a surface-drainage system which was the prototype of this type of construction. This flying field was the first in the world to be given a corrugated surface. Results were satisfactory.

Many new systems of drainage were introduced later. However, these did not completely solve the problem of year-round operation, especially for heavy aircraft. It was therefore decided to provide certain airports with artificial surfaces for runways, taxiways, and hardstands.

7. USSR Airfield Construction in World War II

To maintain winter airports fit for aircraft with wheel undercarriages, it was necessary to deposit snow on the flying field and flatten it. Special appliances for this work were devised by airport personnel since no suitable machines then existed, and there was no time for preliminary investigations.

Even to the present day, not a single capitalist country has such theoretical and practical achievements on problems of winter airport construction to its credit.

The engineer and airport units of the Soviet Army also solved the problem of overcoming muddy conditions on airfields without artificial coverings. Foreign practice was not and is not conversant with these solutions.

After the turning point in the war, when the Soviet armies changed over to the offensive, the airport service had to locate and build a great number of airfields every day, for the retreating enemy had, as a rule, destroyed the regular airports.

Summing up the development of USSR airport construction, it can be said that it has now become an independent branch of technology. The Soviet school of airport construction, both in theory and practice, was and is ahead of every other country in the world.

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